Radio Communications Services

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The Frequency,

March 2013

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ITD—Radio Communications Services

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CITY OF HOUSTON
700 MHZ RADIO PROJECT UPDATE

March 2013 — Radio Project Update

Late last spring, the project team completed and successfully passed the High Noise testing and operational requirements as required under the contract, brought the General Government Service Layer (M2) online, conducted and successfully completed the coverage testing of the M2 GGSL and transitioned Public Works users onto this new layer of the system.

In the later part of 2012, both RCS and the PSRS Project Team continued with the installation and implementation of the Public Safety Layer of the System, which involved the addition of over 41 radio sites, the associated microwave system and completed work on the System Master Site at the Houston Emergency Center (HEC) and the Backup Master Site at Bush Intercontinental Airport. (IAH).

The next critical task for the project was to conduct the Coverage Acceptance Test for the entire system. This effort included testing approximately 10,000 half-mile square grids and one-tenth of a mile square grids downtown. The test covered approximately 2000 square miles of Houston and the ETJ around Houston. The coverage test was conducted over a 12 week period and involved over 200 personnel made up of representatives of the Project Team, HEC, HFD, HPD, dispatchers from both departments, Motorola, Comdex, and the City's Radio Project consultants, RCC. After many long days and nights, the tests were completed; and once all the data was compiled and verified, Motorola passed the test. The requirement of less than 5% failures and the test produced a result of about 1% failures—a resounding success which will result in drastically improved safety for first responders and the citizens they serve.

Additionally, during this process the 147 required buildings were tested. Due to the multiple campus environments and complexity of the buildings, the actual total of structures tested under the 147 Buildings criteria was 519. Twelve buildings were identified under the 147 required building testing that will require remediation. In addition to the required buildings under the SPA thirty-three additional buildings had areas of concern or were marked as failed coverage.

Motorola and the Project team are working on a plan and schedule for the remediation work that needs to be done. The goal is to remediate both the twelve required buildings as well as the additional thirty-three to insure maximum coverage. Work also continues on the Special Coverage Locations identified in the contract which include

(Radio Project Update Continued on page 10...)

PROJECT EVENTS

HIGH NOISE. HIGH STANDARDS.

May 2012 HFD required a high noise test to move forward with a digital radio system. We needed firefighters for this task. They are the right ones to rate the radio system's ability to hear with chain saws and sirens in the background. The contractual requirement was that the digital sound provided in the city's new radio system be as good or better than the analog currently used.

A pool of approximately 39 firefighters participated in this testing, having passed hearing exams, and gone through Motorola's Best Practices training of using digital radios in fire tactical situations.

Right, HFD firefighters rate radio transmissions coming from both an APX 7000 and an XTS 5000 as DeLeon holds them both steadily.

The remaining testing participants create background noise by reading out loud.

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Chief Gregory and everyone at the Val Jahnke Training Facility were very accommodating as Motorola and Radio Communications Services took over some space, and may have even been a bit disruptive as far as the noise level goes.

On the first day of the High Noise test, the firefighters were given a morning briefing. They were given instructions to rate each radio transmission on a scale of 1 to 5 with three different characteristics that were rated:

◊ **Speech** — This rating measured how distorted the speech was in the signal.

◊ **Noise**—This rating measured how intrusive or noticeable the noise was in the background.

◊ **Overall** — This rated the overall quality of the radio transmission.

In addition to rating the originating transmissions with the background noise, testers were then put in high noise environments to rate the same transmissions while the transmissions originated from a room inside the academy.

Above, firefighters sit in the stairwell of the training tower at Val Jahnke while the alarm goes off.

Left, Firefighters rate radio transmissions with the saw in the background cutting through a vehicle.

PROJECT EVENTS

HIGH NOISE. HIGH STANDARDS. CON'D

Different groups of testers stand in front of a pumper while it takes in water from a fire hydrant.

The decibel reading in front of an engine pumping water is about 110 db.

Right, The HATS dummy is secured in an HFD apparatus.

HATS was driven down Telephone Rd and I-45 with sirens and engine noise for about 12 minutes while testers listening back at Val Jahnke rated the sound transmissions.

Another test would have the firefighters inside the fire engine with lights and sirens while the HATS dummy transmitted from a room at VJTF.

Far right, An HFD cadet class assisted by providing the background noise for one test. They stood in a circle surrounding HATS as radio transmissions were originated, while testers in other rooms rated the sound.

Far left, a firefighter in gear listens to radio transmissions, and fills out his test sheet while both his T PASS and VIBE alerts go off.

Left, firefighters also tested the sound through dispatch consoles using headsets for each of the noise conditions.

The two most commonly used phrases heard between tests was, "WHAT?" and "HUH?"

PROJECT EVENTS

COVERAGE ACCEPTANCE TEST PLAN

In June, the M2's (General Government Services layer) coverage was tested in about two weeks. Then, from August through October, the M3's (700MHz Public Safety Radio System) coverage was tested. It took longer because it included random buildings that were tested, and also the 147 required buildings that had to be tested comprehensively. The 147 "buildings" actually came out to be 519 structures with locations such as downtown, Rice University, and The Texas Medical Center each counting as one building. The coverage area was divided into half mile grids, with the exception of the downtown area which was broken into smaller grids.

Above left, Houston Airport Systems escorts a field team on one of the runways at Bush Airport. Above rights, a consultant from RCC researches on whether grids marked inaccessible may have another point of entry or if they're reachable somehow.

A simple summary of the different test phases are:

Street Test of 800 MHz system—Tests performed in vehicles, getting out to test only if the transmission failed.

Random Building Test– The 700MHz system test consisted of entering a building every half mile to test radio transmissions. If the area was residential, then the test was performed in vehicles.

Required Building Test– The 147 required buildings were tested for M3's in-building coverage, including the lowest basement possible, stairwells and elevators.

Each test team consisted of three members: a city representative (either an HPD officer of HFD firefighter), a Commdex representative (on behalf of Motorola,) and an RCC Consulting representative.

Other agencies coming onto the CoH's 700MHz system helped out as well. They got to test their own areas and see for themselves how they liked the coverage.

In addition to seeing some interesting spots and behind the scenes peeks at several Houston landmarks, they also got to deal with other things such as:

● *panicked citizens coming at them after car accidents or seeing children locked in a car* ● *a gun drawn on them* ● *the decision to test another room after walking in on an art class drawing a live nude model* ● *pulled over by a neighboring jurisdictions. Multiple times. To the point where they are now known on a first name basis* ● *civilian team members that got ill after realizing they are testing in a basement among cadavers at a medical school* ● *lemur jumping on them* ● *a haunting in the George R Brown, (you decide)* ● *getting stuck in the mud* ●

Test participants followed a process to make sure any failed transmissions were documented, and to keep the test realistic, dispatchers read from magazines and books. Field testers either gave their location in detail or read from a newspaper or magazine. They wore the radio on their hip, and walked in a circle during each test inside a random building. This ensured that at some point, the body was blocking a signal from whatever tower the radio was transmitting from. Good thing police officers and firefighters are used to the public staring at them. They were extremely professional and did a remarkable job of dealing with the business owners and property managers.

Left, The dispatch teams packed tight in one of the training rooms at the HEC, waiting for each field team to gain entry to random buildings.
Center, Members of dispatch teams decide what to read next as they want to keep the testers on their toes, while sometimes entertaining them.
Right, Roll call in the mornings at the HEC consisted of checking out equipment, going over locations and the field teams finding their team members.

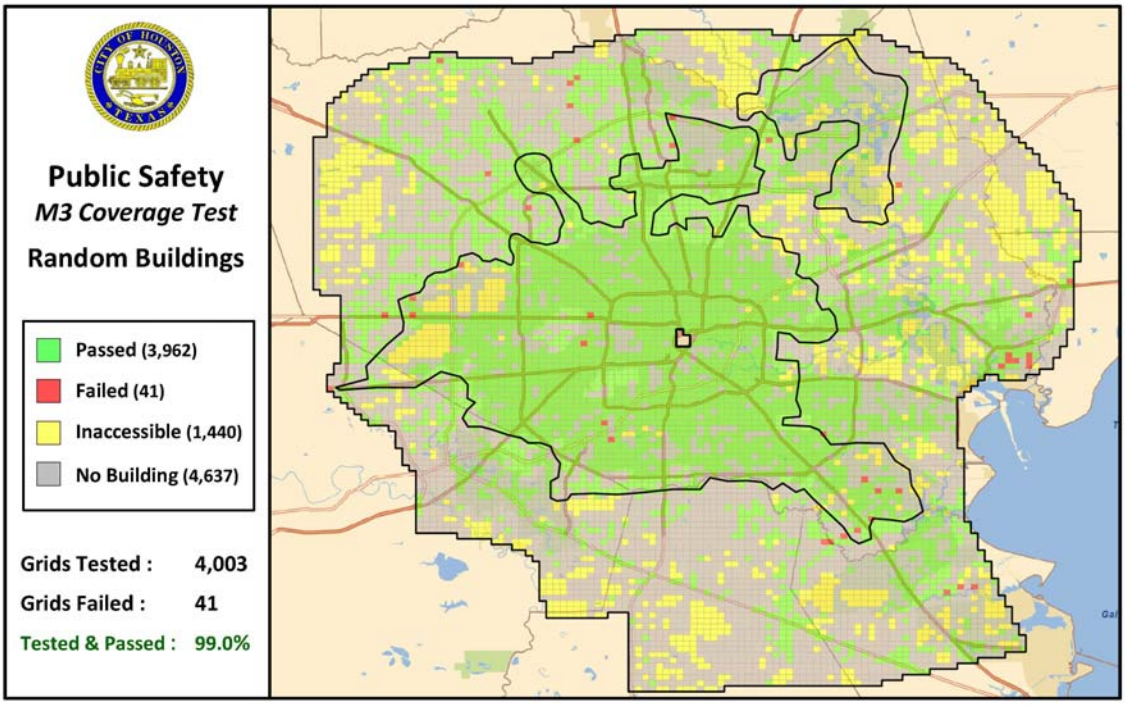
PROJECT EVENTS

TEST RESULTS REPORTED

Right, The list of the 8 high noise environments used in the High Noise test is listed. The conditions were provided to Motorola by HFD, and recreated at VJTF to reach each decibel level.

Left, Four binders, each four and a half inches thick delivers Motorola's data to the city. That smaller binder on top sitting upright is the summary report to review.

Noise Condition Number	Noise Condition Name	Method 1 - TOTAL Speech + Noise + Overall Preferred	Method 2 - OVERALL Overall only Preferred	Does Digital Radio meet or exceed baseline analog test results? (see note)
1	Quiet	Digital	Digital	Yes
2	Auditorium / Speech	Digital	Digital	Yes
3	Fire Truck	Digital	Digital	Yes
4	Fire Alarm	Digital	Digital	Yes
5	Pump Panel	Digital	Digital	Yes
6	Rescue Saw	Digital	Digital	Yes
7	Ventilation Fan	Digital	Digital	Yes
8	SCBA w/ PASS, Vib	Digital	Equal	Yes



Left, a preliminary map is made from the raw data gathered. It shows coverage of the 700MHz system in random buildings.

Each square represents a half mile grid, with the exception of downtown which was broken into one-tenth mile grids.

Inside city limits, 20db buildings were tested from inside. Outside of the city limits within the coverage area, 10 db buildings were tested from inside buildings. In downtown, 30 db buildings were tested for in-building coverage.

Training Corner

Motorola came in and trained HFD dispatchers on their new consoles for the Interim radio system in the spring. Pat Irby, the trainer, provided a good basis of understanding of the digital sound and trunking technology.

Along with HFD dispatchers, some additional HFD personnel on the training committee for suppression and EMS, came in for a half day to get a preview of their training session. There was even a PD dispatcher that came in for some cross training, and get as familiar as possible with the new radio system.

HPD sent their trainers through Motorola's Train-The-Trainer sessions in September. The selected participants are responsible for training the rest of the police officers as per their training plans.

Pat Irby from Motorola trained HFD dispatchers in April.

There were also several training sessions for the High Noise and Coverage Testing. The police officers, firefighters, HFD dispatchers, and HPD dispatchers who participated in the coverage testing all had training on the testing processes and best practices.

The next training will be in January to train the HFD and HPD trainers on using the new consoles on the 700MHz system.

Matthew Busa, a Motorola trainer and volunteer firefighter from Plantation, Florida, delivers Best Practices training to the participants of the high noise test.

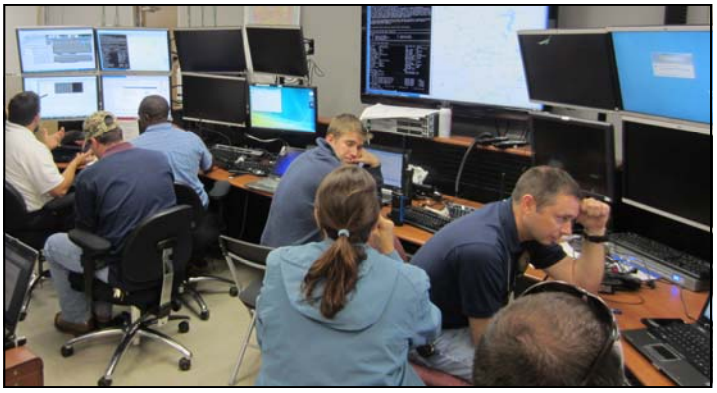
Send your questions to:
RadioComServicesTraining@HoustonTX.gov

Tejas from Commdex checks in during break while the dispatchers are training for coverage testing.

RCS technicians have been busy with their training as well. . So busy, that one day they had to "double up."

Motorola has been providing training to RCS staff so the city will be prepared to sustain the new technology. The picture on the right shows two groups separated by their specialties. The group on the left is learning about the microwave network while the group on the right is learning how to manage the M3, or the Public Safety layer of the radio system.

All of this training is in addition to keeping the current UHF systems up and running, while preparing for the cutover in the near future.



In Memoriam We lost one of our own in 2012. William "Bill" Tribble, or Mr Tribble, as we affectionately and respectfully referred to him, worked in Radio Communications Services for about 4 years, after an over 50 year career in the US Navy. He was an expert in Collision Avoidance Systems, Radar Navigation Systems, as well as Radio and Satellite Communications.

He was a devoted husband, father, friend, soldier, and employee. He was a warm person who could get along with anyone. He had a sunny disposition and a genuinely good work ethic. Good working relationships came naturally for him. Through his career with the navy, he developed a passion for traveling. He led a greatly full life, rich in both life experiences, and admiration from family, friends and colleagues. He was a good man and will be missed.

Rest in peace, Mr. Tribble.

Mr Tribble, March 24, 1942—February 4th 2012

News and Happenings

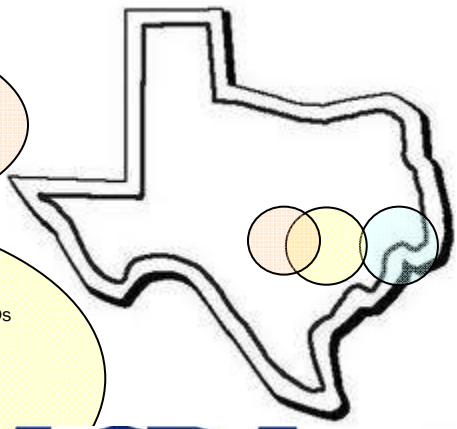
Saturday April 21, 2012 4:00am: Todd, Marc, Nick, Herbert and Chayne report to work.

The public safety communications community joined forces to provide continuous radio communications from Houston to Austin for the MS 150. Hats off to Harris County, the Lower Colorado River Authority, and the City of Austin for their enthusiasm to use this event as a rehearsal to work together, and be prepared in the event of a significant incident. All three radios systems gave each other access, sharing resources to provide coverage for first responders traveling along the route.

Several teams of first responders traveled with the MS 150 from Houston all the way to Austin. These teams were provided with 100 radios that could be used the entire route to communicate to each other. The talkgroups programmed in the radios were the same talkgroups used across Texas for the sole purpose of pubic safety interoperability. First responders along the route had their own locally issued radios, still had access to the public safety interoperability channels as they are provided by one of these three radio systems on a daily basis.

Greater Austin /Travis Regional Radio System (GATRRS) provides coverage on GCI 1, GCI 2 and GCI 3 talkgroups.

Once the MS 150 passed LaGrange, any of the agencies supported by GATRRS could listen in on the activity headed their way.



Lower Colorado River Authority (LCRA) provides coverage on LC_CM_1, LC_CM 2, and LC_CM3 talkgroups. Fayette County, Bastrop and Elgin PDs and FDs are just a few examples of the agencies LCRA supports.

Once the MS 150 passed Fayetteville, LCRA provided continuous radio coverage all the way to Austin, to its own agencies along the route, and to the first responders following the event in its entirely.

Harris County Regional Radio System provides coverage on TX CMD T, TX LAW1, and TX LAW3 talkgroups to the hundreds of agencies and departments it supports.

Harris County's system gave the MS 150's first responders' coverage from Houston to Fayetteville.

In the future, Harris County will provide these, and other interoperable talkgroups to City of Houston radios.

These three public safety radio systems networked together to create a path of interoperability from Houston to Austin. Events like this help public safety communications personnel from different regions practice interoperability, and be more prepared in the event of a significant incident in the future.

Pictured left: A ride team consisting of Harris County Deputies ride for their friend, Mark Houston. Houston is a former Harris County Deputy, now confined to a wheel chair and benefits from Multiple Sclerosis research.

Pictured Center: Chayne, Marc, Nick and Todd are looking pleased, as a long Saturday winds down.

Pictured Right: From left to right, Raul Maldonado from Harris County, Chayne Pierri, Herbert Hughes, Nick Curran, Marc Vaughn, Todd Johnson (all CoH) and Jim Bridwell from Harris County. RCS CoH couldn't ask for a better team than that from Harris County to work with, as we have begun radio interoperability tasks and planning of connecting radio systems.

News and Happenings

As the Mayor's Office of Special Events (MOSE) hosted the Freedom Over Texas event for the citizens of Houston, RCS was proud to provide them communications needed for the event.

Kudos to Chayne for working through the holiday so RCS could provide this additional service to one of its customers. Kurt stopped by and took these two pictures of Chayne. It was a lot of work getting those radios programmed and delivered. While most people were enjoying the 4th of July holiday, having a good time, Chayne was working with MOSE behind the scenes, helping them make the event to go as smoothly as possible.

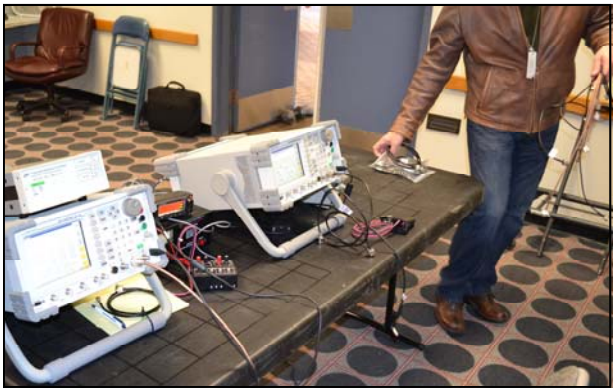
Left, Chayne counts radios as they are charged up, programmed, and ready for deployment to those working the event. Center, Chayne plans the logistics with the one of two coordinators of the event. Right, Citizens enjoying the 4th of July celebration coordinated by the Mayors Office of Special Events.

7.13 UPGRADE

Motorola has staffed up and been working to touch and upgrade all the city's radios with the newly released firmware. Motorola brought in 10 engineers from Plantation to set up the process.

Many of those that worked on the coverage testing have been asked by Motorola to come in and help with the upgrade portion of the project.

The whole process from start to finish takes about 35 to 40 minutes per device. It's estimated that every radio will be "touched" and completely upgraded by February 1, 2013.



Left, Motorola engineers set up the process of installing the 7.13 flashware. Right bottom, Motorola brings people in to work the process of flashing, cloning, programming OTAR, testing on the AeroFlex, and alias verification. Right top, The AeroFlex machines are set up at station 64 to start the same process with mobiles and handhelds already deployed.

ITD Radio Communications Services and Motorola are located:
523 N. Sam Houston Parkway East, Suite 200, 2nd. Floor
Houston, TX. 77060

News and Happenings

History is made. Years from now, people will argue about who the first Houston firefighters were that went into a burning building using digital technology. The answer is these two unidentified HFD cadets pictured below, in this photo taken May 22, 2012.

Above, these two cadets use HFD's first ever digital talkgroups.

Right, Herbert and Chayne reprogram all the radios used at the VJTF.

Chayne and Herbert made a special trip to Val Jahnke Training Facility (VJTF,) and programmed their XTS 5000 radios with codeplugs that will give them 3 direct digital talkgroups on the 800MHz Interim Radio System.

The instructor listened to the cadets from his radio outside the burn building, and said that he was pleased at being able to hear the cadets more clearly than before. That same instructor led by example on how to project one's voice on the radio, coaching cadets to talk more clearly, reminding them to remain calm so others can understand them.

While these two cadets have gone on to serve the citizens of Houston, and no doubt mopped a lot of floors at their fire stations as rookies do, they are the first from HFD to go into a burning building using digital talkgroups on city radios.

Another Step Forward

At the end of November, the systems team from RCS accomplished a huge step in moving forward to the new radio system. For years, the CoH has rented Room G on a high level floor at the JPMorgan tower to house radio equipment. Actually, it's been the main site for 2221, previously known as the public works system.

The 2221 system hasn't operated in a while, but it was still there like an old blankey. Now, it has been completely dismantled and sent to salvage.

Also, on November 28th, RCS technicians very carefully coordinated moving and consolidating needed equipment from Room G to the new room already housing the new radio system. The fiber optic plugged into the sonnet had to be moved and the CoH vacated the old room as it was no longer necessary.

The teamwork of such an effort should be recognized as none of the departments noticed any interruption or experienced any outage. It was a very smooth transition and they kept HFD, HPD, and all of the government services still up and running without so much as a hiccup.

Cleaning Day

Imagine working at a place where employees take pride in their work and their workplace. That's us.

Here are some pictures of the squeaky clean radio bay at 1205 Dart. It is not clear if there is a cleaning day on a regular basis, but apparently it's a special enough occasion to take pictures. Looking good!

News and Happenings

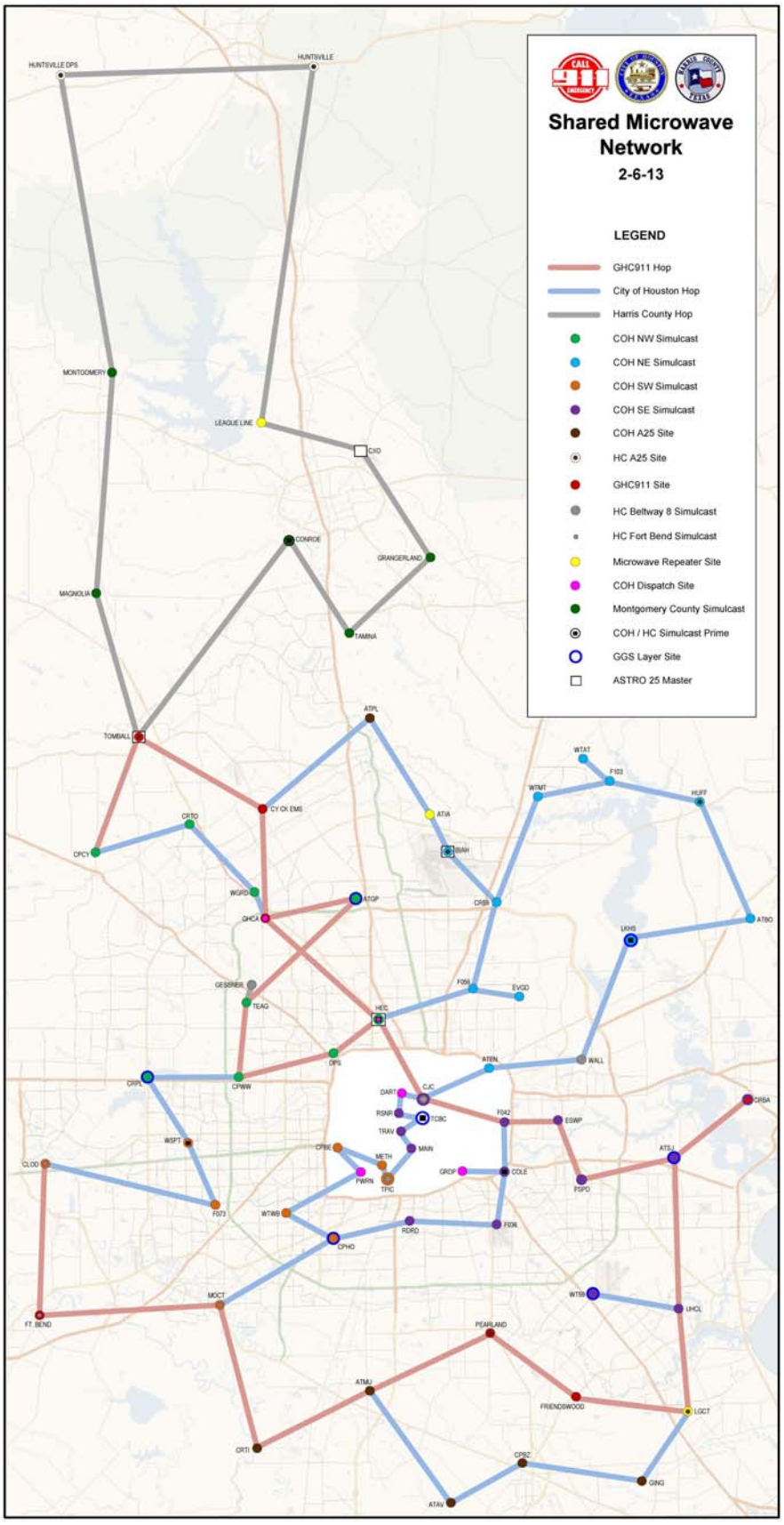
...Radio Project Update Continued from page 1

- Galleria Mall, (work has started and is targeted for completion later this spring)
- Reliant Stadium (Which passed the coverage test using just the system infrastructure and therefore will not need any remediation)
- 7+ miles of the downtown tunnel system including the Harris County Tunnels. (The City has been working with the Downtown District to install the necessary coverage equipment in a joint effort with the Cellular providers to provide both emergency radio service coverage as well as Cell phone coverage in the tunnels. This initiative is moving very well and should parallel the 700 MHz Radio Implementation Schedule.

During the Coverage testing, some audio issues that were identified within the radio firmware. These issues were resolved with the latest software release (7.13) by Motorola which was released on December 3rd of 2012 and is being added to all our subscriber radios. Each radio is currently going through the processes of retouching and upgrading the firmware and software. This tremendous effort started in late December and kicked into high gear on Jan 7, 2013.

The schedule to get every radio (more than 15,000) touched shows a target completion date of the last week in March. This will include all the mobiles and portables for both police and fire.

Lastly, Motorola has released the latest version of the System Road-Map Software which is also titled 7.13 and it will be installed in our system in the near future. Upgrade Operations (UO) from Motorola is due to be here on site the weeks of April 8th – April 26th to upgrade our system. Cutover to the new system would be shortly after that.



Right, Graph of shared microwave network between City of Houston, Harris County Hop, and Greater Harris County 911 Hop as of February 6, 2013.

Good Times and Celebrations!

Kurt graduated from ITT in April, with both highest honors, and perfect attendance.

Pictured above, is Kurt with his longtime family friends. We know his family in Taiwan is just as proud of him as we are. Congratulations Kurt!

The Frequency caught the delivery of Lynn's flower bouquets from her family on Mother's Day.

Todd was pleasantly surprised that his team remembered his birthday, and took five minutes to celebrate...

...Todd's team was pleasantly surprised they got five minutes of not having new and exciting challenges presented and tasked to them.

During Coverage Testing, an HFD firefighter was asked to host a ride along with the Houston Chronicle. Click *here* to see the story.

Nick's son Callum, seems to be leaning towards the fire academy...

Grady, from Commdex, takes a breather during coverage testing. No matter how stressful it got, he could always crack a smile.

Nick won every round of Rock, Paper, Scissors, to drive the golf cart around the MS 150

What's the Deal

What's the deal with huge antennas?

It's the first thing anybody notices when they pick up a new city radio. The antennas have a lot of responsibility to the user. Public safety needs this particular antenna to receive the different bandwidths until we cut over and only use the 700 and 800 spectrums.

RCS does not recommend putting any non-departmental approved accessories on radios. There are options available, but any shorter antenna compromises the coverage their radio receives. In the future, more flexible antennas made for 700 and 800 spectrums will be available for departments to approve for use.

The Frequency newsletter archives are kept online at

http://www.houstontx.gov/hits/radio/index.html

If you want to play "What's the Deal?" just drop an email to RadioComServices@HoustonTX.gov

Anyone can send an email with radio project related questions. Your question may be featured in *The Frequency*. If there's something you want to know, come get a first-hand response.